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| 10/759,953 | 01/16/2004 | Kiyoshi Satoh | ASMJP.055DV1 | 8185 |

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| EXAMINER |
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ALEJANDRO MULERO, LUZ L

| ART UNIT | PAPER NUMBER |
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1763

DATE MAILED: 11/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-------------------------------|-----------------------------|--|
| Office Action Summary | Application No. 10/759,953 | Applicant(s) SATO ET AL. | |
| | Examiner Luz L. Alejandro | Art Unit 1763 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 September 2005.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10, 14-19 and 45 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10, 14-19 and 45 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>0905</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3 and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shang et al., EP 0 697 467 in view of Igarashi et al., U.S. Patent 5,031,571 and Iyer et al., U.S. Patent 6,498,109.

Shang et al. shows the invention substantially as claimed including a chemical vapor deposition device comprising: a deposition reaction chamber 10; a plasma discharge chamber 46 that is provided remotely from the reaction chamber; wherein the plasma discharge chamber includes a capacitively coupled RF plasma source and comprises a source of cleaning gas 44, wherein the source of cleaning gas is connected to the plasma discharge chamber; and a stainless steel piping 57 that links the reaction chamber and the remote plasma discharge chamber, wherein energy coupled to the remote plasma discharge chamber activates cleaning gas within the plasma discharge chamber, and the activated cleaning gas is brought into the inside of the reaction chamber through the piping and changes solid substances adhered to the inside of the reaction chamber as a consequence of film formation, to gaseous substances, thereby cleaning the inside of the reaction chamber, wherein internal surfaces of the piping

comprises stainless steel not corroded by the activated cleaning gas species (see fig. 1 and its description).

Shang et al. does not expressly disclose a wall of the plasma discharge chamber that is made of an aluminum alloy, wherein the wall is exposed to plasma discharge, and the plasma discharge chamber including a radio frequency energy source connected to plasma discharge chamber electrodes, wherein the RF energy source operates at a frequency between about 300 kHz and about 500 kHz and a power between 50 watts to 5 kilowatts. Igarashi et al. discloses a capacitively coupled RF plasma power source including plasma discharge chamber electrodes 10,20 with an exposed aluminum alloy chamber 30 (see fig. 1 and its description, and col. 3-lines 59-66). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Shang et al. so as to include the capacitively coupled structure of Igarashi et al. for the plasma discharge chamber because this is shown to be a suitable means in which to energize gas into plasma.

Both Shang et al. or Igarashi et al. do not expressly disclose wherein the RF energy source operates at a frequency between about 300 kHz and about 500 kHz. Iyer teaches a plasma processing apparatus (see fig. 1) including a remote plasma discharge 12 coupled to a plasma energy source 28, wherein the plasma energy source may be a pair of oppositely placed electrodes in order to create reactive species where the frequency can range from 10 KHz to 200 MHz (see col. 3-lines 24-60). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time

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the invention was made to modify the apparatus of Shang et al. modified by Igarashi et al. so as to have electrodes of the plasma discharge chamber operating at the frequencies disclosed by Iyer because these frequencies are shown to be suitable for creating reactive species.

With respect to the piping being fluorine passivated, note that the presence of the fluorine cleaning gas will passivate the stainless steel piping with fluoroine.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shang et al., EP 0 697 467 in view of Igarashi et al., U.S. Patent 5,031,571 and Iyer et al., U.S. Patent 6,498,109 as applied to claims 1-3 and 14-16 above, and further in view of Li et al., U.S. Patent 6,143,084.

Shang et al., Igarashi et al., and Iyer et al. are applied as above but do not expressly disclose fluoroine passivated aluminum or aluminum alloy piping. Li et al. discloses using aluminum piping 116 in a plasma apparatus (see fig. 1 and its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Shang et al. modified by Igarashi et al. and Iyer et al. so as to have the pipes made of aluminum because Li et al. shows that aluminum piping is suitable to be used in a plasma apparatus.

With respect to the piping being fluorine passivated, note that the presence of the fluorine cleaning gas will passivate the aluminum piping with fluoroine.

Claims 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shang et al., EP 0 697 467 in view of Igarashi et al., U.S. Patent 5,031,571 and Iyer et al., U.S. Patent 6,498,109 as applied to claims 1-3 and 14-16 above, and further in view of Fujimura, U.S. Patent 4,718,976.

Shang et al., Igarashi et al., and Iyer et al. are applied as above but do not expressly disclose a through-flow valve positioned between the remote plasma discharge chamber and the reaction chamber. Fujimura discloses a plasma processing apparatus including a conductance regulating valve including a conductance regulating plate 22 in the form of a disc having a circular opening 21 disposed between a remote plasma generating chamber 27 and a treating chamber 30. The introduction of gas may be regulated by using different diameter of opening 21, or by using a shutter mechanism. The gas conductance device may include a circular gas diffusion plate 25 which can be moved up and down to close and open the opening 21, the conductance regulating plate 22, gas diffusion plate 25, and barrier 32 may be made of material such as aluminum which is highly resistant to treating gas such as etching gas (see col. 3-line 19 to col. 4-line 50). The valve is in contact with the plasma discharge and is heated by the plasma gas. In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Shang et al. modified by Igarashi et al. and Iyer et al. to implement the gas regulating device as taught by Fujimura in order to regulate the rate of introduction of activated gas into the treating chamber.

Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shang et al., EP 0 697 467 in view of Igarashi et al., U.S. Patent 5,031,571 and Iyer et al., U.S. Patent 6,498,109 as applied to claims 1-3 and 14-16 above, and further in view of Noble et al., U.S. Patent 6,450,116.

Shang et al., Igarashi et al., and Iyer et al. are applied as above but do not expressly disclose a reaction gas inlet and outlet defining a horizontal flow across a substrate surface upon which material is deposited within the reaction chamber, wherein the piping opens into the reaction chamber downstream of the inlet and upstream of a substrate support configured for supporting a substrate within the chamber, and wherein the reaction chamber comprises quartz walls and radiant heating elements. Noble et al. disclose a process gas entering into the reaction chamber 213 from the inlet 214 and passing over the substrate 100 in the reaction chamber and being exhausted via 253 (see fig. 3A and its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Shang et al. modified by Igarashi et al. and Iyer et al. so as to include the gas inlet/outlet structure of Noble et al. because such a structure is shown to be a suitable means in which to introduce and remove gas from a plasma processing chamber.

Concerning the quartz walls and the radiant heating elements, Noble et al. includes light pipe assembly 218 including lamps 219 disposed between quartz plates 247,248 (see col. 7-line 59 to col. 8-line 36). In view of this disclosure, it would have

been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Shang et al. modified by Igarashi et al. and Iyer et al. so as to include the quartz plates and radiant heating elements because this will allow for the apparatus to be capable of conducting processing at elevated temperatures.

Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shang et al., EP 0 697 467 in view of Igarashi et al., U.S. Patent 5,031,571 and Iyer et al., U.S. Patent 6,498,109 as applied to claims 1-3 and 14-16 above, and further in view of Ikeda et al., U.S. Patent 5,520,142.

Shang et al., Igarashi et al., and Iyer et al. are applied as above but do not expressly disclose wherein the wall is anodized. Ikeda et al. discloses forming a chamber wall of aluminum and anodizing the exposed portion in the plasma chamber (see fig. 1 and its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Shang et al. modified by Igarashi et al. and Iyer et al. so as to have an anodized inner wall because Ikeda et al. shows this to be a suitable treatment to be done to a wall of a plasma chamber.

Response to Arguments

Applicant's arguments filed 09/15/05 have been fully considered but they are not persuasive. Applicant argues that the references of record fail to disclose fluorine passivated piping. However, note that the presence of the fluorine cleaning gas will

passivate the aluminum or stainless steel piping with fluorine, and therefore the apparatus of the rejection stated above would be expected to have the same corrosion properties as that of the instant invention. Concerning the fact that the references do not show the piping fluorine passivated in advance, it is noted that the features upon which applicant relies are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the motivation to combine the references are clearly stated in the above rejections.

Concerning the fact that such a large frequency range as shown in the cited references does not provide a prima facie case of obviousness for the claimed range of applicant. However, the examiner notes that applicant has not shown unexpected results with respect to the narrow range over the wide range and therefore a prima facie case of obviousness still exists.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 571-272-1430. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Luz L. Alejandro
Primary Examiner
Art Unit 1763

November 21, 2005